CYCLES IN CHRONOLOGY.[1]

THAT the 1260 years understood to be expressed by the "time, times, and a half" (taking "time" to indicate a prophetic year of 360 days each) of Dan. xii. 7, and repeated in Rev. xii. 6 and in Rev. xi. 2 and xiii. 5 under its equivalent term "forty and two months" (taking a month as thirty days), was in fact an astronomical cycle, was first suggested by Loys de Chéseaux in a work published at Paris in 1754, three years after the author's death. But it did not meet with much attention in England until a small work on the subject was published by Mr. W. Cuninghame in 1834, and it was subsequently more fully explained by Mr. H. Grattan Guinness in his "Approaching End of the Age," which appeared in 1878.

Dr. Bell Dawson however, in a pamphlet now before us, goes into the matter much more elaborately, using the most recent knowledge of the lengths of the solar and lunar years (by lunar year he means twelve lunar synodic months or lunations), and finds a remarkable correspondence between multiples of these which coincide with those of the number in Daniel. As seven is a perfect number in Scripture, and Daniel mentions three and a half prophetic years ("time, times, and a half"), he thinks that the 1260 must be doubled, which makes 2520 lunar years. Now a lunation contains, according to the most modern determinations, 29·530589 days; 504 of these are equal to 178,601 days and 2520 to 893,005 days within about four minutes. An eclipse-cycle is also pointed out, *i.e.*, that 649 solar years are almost exactly equal to 8028 (223 × 36) lunations (the former amounting to 237042·1853, and the latter to 237042·0355 days), which is much more accurate than the Metonic cycle.

Dr. Bell Dawson carefully notes the different values which have been found (observationally and theoretically) for the secular acceleration of the moon's mean motion; but he seems to have forgotten that though probably constant or nearly so in amount, its effect, when long periods of time are taken into account, varies like the accelerating force of gravity, as was pointed out by Halley, its discoverer, according to the square of the number of centuries. As Chéseaux had done before him, he shows the astronomical significance of the cycle 2300 years in Dan. viii. 14, as well as that of the 1260 years before spoken of; but he treats it somewhat differently. Chéseaux (whose scheme, we may mention, is explained in the second volume of Mr. Chambers's "Handbook of Astronomy") took the difference between 1260 and 2300 (*i.e.* 1040) years, and showed that 1040 solar years form a period almost exactly equal to 12,863 lunations, the former amounting to 379851·8839 and the latter to 379851·9624 days. But Dr. Bell Dawson takes them as lunar years (or periods of twelve lunations) and shows that 1780 (the mean between 2300 and 1260) lunar years is almost precisely equal to 1727 solar years, each exceeding 630773 days by only 0·27 and 0·37 respectively, and therefore differing from each other by only 0·10 of a day in that time or about 0·006 in a century. It does not appear that any reference is made to the 1290 and 1335 days of Dan. xii. 11 and 12. No attempt is made to discuss the *terminus à quo* (or therefore *ad quem*) of Daniel's periods, being beyond the scope of the paper before us, which treats only of the numbers themselves and their accordance with astronomical epochs.

Dr. Bell Dawson inserts a reflection on the inferior accuracy of the Roman calendar arrangements to those of the Chaldeans and other Oriental nations. It is probable, however, that when Julius Cæsar reformed the calendar he decreed that each fourth year should be an intercalary year, not because he was not aware that the actual length of the year was somewhat less than 365¼ days (a question which had been discussed by Sosigenes, who assisted him), but because he thought it would be a convenient rule and sufficient for all practical purposes. In this a distinguished astronomer of our own day (Prof. Newcomb) agrees with him; and indeed the chief object of the introduction of the Gregorian calendar was to bring back the date of the vernal equinox to that which it had at the epoch of the Council of Nicæa.

W. T. L.

PREVENTABLE DISEASE AND MILITARY STRENGTH.

IN a letter to the *Times* (June 6), Mr. St. John Brodrick directs attention to the serious diminution in the military strength of an army, not to say the terrible loss of life, which ensues in campaigns from diseases which are largely preventable. It is a truism, well recognised by medical men, that the soldier has much more to fear from the ravages of disease than from the bullets of the enemy. Mr. Brodrick points out that

> "In South Africa the deaths per 1000 were 69 from disease and 42 from wounds, but the admissions to hospital were 746 per 1000 from disease and 34 from wounds. In other words, about 450,000 were passed through the hospitals for disease during the war, and 14,800 deaths occurred, while the admissions for injuries in action were only 22,000."

Dysentery and enteric fever are the great scourges of an army in the field, and, as was pointed out in an article in NATURE (lxxii., p. 431), are largely preventable. That this is the case is proved by the records of the Russo-Japanese War, in which the Japanese had a total of some 221,000 killed and wounded and 236,000 cases of sickness, a ratio very different from that which obtained in our own army in the Boer War. The Japanese have realised to the full the importance of hygienic measures in the field; sanitary corps went on ahead of the main army and chose the camping grounds, supervised the water supplies, and exercised a rigid sanitary control in all matters, with the above result.

Mr. Brodrick suggests one simple remedy:—

> "Why should not the admirable body of Army Medical officers who have made sanitary conditions a study educate combatant officers in the elements of military hygiene? Every cadet at Sandhurst or Woolwich should be examined on passing out in a problem which he should grasp as easily as tactics or strategy, since upon it the fighting strength by which he is to win his battles depends. A captain before promotion to major might be encouraged to get a special certificate which would excuse him from all such training at the Staff College."

Sir Frederick Treves, in a letter to the *Times*, cordially supports this suggestion, and goes further, advocating that a like knowledge of a more elementary character should be possessed by the private soldier.

In addition it may be added that the formation of a sanitary corps seems desirable to aid the medical staff, to guard and control the water supplies, and the like. At present the Army Medical officer is powerless to enforce sanitary measures; although responsible, he can give no orders, and can only act through a commanding officer, often junior to himself, who has no technical knowledge. Moreover, through the Esher Committee, the Director-General, who formerly had direct access to the Secretary of State and had a seat on the Army Council, has been

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[1] "Solar and Lunar Cycles implied in the Prophetic Numbers in the Book of Daniel." By Dr. W. Bell Dawson. Pp. 20. (From the Transactions of the Royal Society of Canada, vol. xi., Section 3.)

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deprived of those privileges, the Adjutant-General at present being practically head of the Medical Department. Now that a former Secretary for War has directed public attention to the matter, it is to be hoped that those in authority will recognise that medical science is a vital part of military strength, a dictum which has for years been preached by the medical profession.

NOTES.

AT the meeting of the council of the Royal Astronomical Society, held on Friday last, June 8, the following resolution was unanimously agreed to:—"That the council learn with deep concern of the danger threatened to the Royal Observatory, Greenwich, from the erection of a large electric generating station near the observatory; and desire to represent to the Admiralty at the earliest opportunity their conviction of the paramount importance of maintaining the integrity and efficiency of Greenwich Observatory, which has been adopted as the reference point for the whole world." It was further resolved that a copy of this resolution be forwarded to the First Lord of the Admiralty.

MR. HALDANE, M.P., Secretary of State for War, will open the electrical laboratory of the National Physical Laboratory on Monday, June 25, at 2.45 p.m.

AT the twenty-fifth annual meeting of the Royal Society of Canada, recently held at Ottawa, Dr. William Saunders, the director of the Dominion Government's system of experimental farms, was elected president for the ensuing year, with Dr. S. E. Dawson vice-president.

INVITATIONS have been issued by the Institution of Electrical Engineers for a conversazione at the Natural History Museum on Tuesday, June 26, to meet the visiting delegates from kindred institutions.

PROF. K. BIRKELAND, of Christiania, the inventor of the only successful commercial process for obtaining nitric acid by the direct oxidation of atmospheric nitrogen, will read a paper before the Faraday Society about June 26 entitled "Oxidation of Atmospheric Nitrogen by Means of the Electric Arc."

MUCH interest was aroused in India some time ago in the attempt to introduce the permanganate treatment of snake-bite. In the Central Provinces a large number of Sir Lauder Brunton's lancets were distributed last October for use by vaccinators and selected landholders. Several cases of successful treatment have been reported to Government, but unfortunately, says the *Pioneer Mail*, none of the reports gives sufficient detail to prove that the bites were really those of poisonous snakes, and it is therefore not possible to form any conclusions as to the value of the treatment.

A PARTY of Birkbeck College zoological students spent Whitsuntide at West Mersea, near Colchester, collecting marine specimens. Owing to the low temperature of the surface waters the tow-netting expeditions were not very productive, but many and varied forms of life were brought up by the trawl and the dredge.

THE annual conversazione of the Royal Geographical Society will be held at the Natural History Museum tomorrow evening, June 15.

A TELEGRAM from Reggio di Calabria states that fairly strong earthquake shocks were felt there on June 10 at 2.30 a.m. and 9.45 a.m. At Monteleone, Calabria, two strong shocks were felt at 2.45 a.m.

PROF. W. F. KOHLRAUSCH, of Hanover, will be the president of the Verband deutscher Electrotechniker for 1906–8.

DR. BERNHARD MOHR, of London, recently presented to the museum of the German Chemical Society 100 letters written by the famous Liebig to Dr. Mohr's father, the late Prof. Friedrich Mohr, of Bonn, during the years 1834 to 1869.

DR. STUTZER, assistant in the geological institute of the Freiburg (Saxony) Mining School, has been awarded a grant of 2000 marks by the committee of the Carnegie fund to enable him to continue his investigations on iron deposits in Lapland.

PROF. LUDWIG BOLTZMANN, the well-known professor of theoretical physics in the University of Vienna, has been awarded the prize of the Peter Wilhelm Müller fund of Frankfurt a.M. The award consists of an appropriately worded gold medal and 9000 marks, and is made to the most brilliant workers in pure science.

AT the seventy-eighth meeting of the Deutscher Naturforscher und Aerzte, which will be held this year on September 16–22 in Stuttgart, there will be an exhibition of scientific and medical appliances and subjects as in previous years. The König Karls Hall of the Königlicher Landesgewerbemuseum has been set apart for the purpose. All announcements and communications may be addressed to the president of the exhibition committee, Dr. Lampert, Archivstrasse 3, Stuttgart, from whom further particulars may be obtained.

PROF. WALTER NERNST, professor of physical chemistry in Berlin, has declined the opportunity of proceeding to Leipzig as the successor of Prof. Ostwald, whose resignation will take place on September 30. Prof. Nernst was formerly a privatdocent at Leipzig from 1889 to 1891, when he accepted a professorship in Göttingen University. According to the *Physikalische Zeitschrift*, Prof. Ostwald's successor is to be Dr. K. Haussermann, professor of technological chemistry and director of the applied chemistry laboratory of the Technical High School, Stuttgart.

A SPECIAL meeting was held in the Great Hall of the University of Athens on May 20 to celebrate the fortieth anniversary of Dr. A. C. Christomanos's appointment as professor of chemistry in the University. A large audience, including the Greek Minister of Education, the University professors and students, and many of the general public, was present. Dr. A. C. Dambergis, the professor of pharmaceutical chemistry, referring to the great work which Prof. Christomanos has done in the forty years, asserted that the greatest has been the pioneer work in the introduction of scientific chemistry into Greece with the provision for laboratory work in chemistry and the other sciences, and more particularly in organising so successfully the large chemical department of the University with its laboratory accommodation for 130 students. Prof. Christomanos was the recipient of numerous honours, including several from foreign countries.

DR. RUDOLF KNIETSCH, the director of the Badische Anilin- und Soda-Fabrik, died on May 28 at the early age of fifty-two. From the *éloge* dedicated to Dr. Knietsch's memory by the Badische Anilin- und Soda-Fabrik, we learn that Dr. Knietsch was born in 1854 in Oppeln, in Schlesien. From 1876–1880 he studied at the Technical High School in Berlin, and graduated in 1881 at Jena University. He was for a short time an assistant in Dr. Emil Jacobsen's private laboratory, and in 1882 entered the Farbenfabrik von Bindschedler und Busch in Basle,

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